

**Natural Resources Conservation Service  
Texas Forestry Technical Note, TX-FS-12-3**



## **SITE PREPARATION**

**Site preparation** is a widely used method to facilitate the establishment of a desirable stand of trees. Site preparation activities remove or reduce competing vegetation, reduce or remove unwanted trees and logging debris, and/or prepare the soil to promote the growth and survival of desired tree species. There are many methods of site preparation that fall under either chemical or mechanical site preparation. The primary objective is to have an area suitable for planting and establishing a new stand of trees.

Site preparation prescriptions are based on a stand by stand basis that evaluates existing competition, debris on the site, and soil. Generally, site preparation follows a harvesting operation where the merchantable trees have been removed through a logging operation. Areas that have been severely damaged by ice storms, tornadoes, hurricanes or wildfires that have lost the majority of their desirable vegetation are prime candidates for site preparation prior to reforestation. Site preparation may be necessary when converting pastures or cropland back to trees or woody shrubs.

### **Mechanical Site Preparation**

Mechanical site preparation is a method of reducing competing vegetation, removing logging or storm damaged debris or preparing the soil by using large machinery such as bulldozers, skidders, tractors with certain implements attached to them. Mechanical practices are reliable methods of preparing an area to be reforested either by direct seeding or planting seedlings. However, use can be restricted somewhat by wet weather, poor drainage or extremes in topography. Other problems include negative impacts on erodible or fragile soils and the potential for abundant hardwood sprout development.

**Shearing:** Shearing is a common method of site preparation where a K-G blade or similar is attached to a large bulldozer. The blade cuts the trees off at the ground line. This method of site preparation is very good if there are a lot of residual trees left on the site. In regenerating hardwood trees, shearing is a very good method to initiate natural regeneration by stump sprouting. In regenerating pines, the sheared area could be prescribed burn to reduce the debris prior to planting and reduce the number of hardwood sprouts.

**Piling:** Piling is often associated with shearing operations. The debris severed at the stump is pushed into piles or windrows. In piling woody debris, the blade in front of the dozer should have teeth or bars that extend down below the primary blade to facilitate soil from being pushed into the piles. Also, check to make sure that debris is not pushed into drainages. Windrows should follow the contour of the site about 100 to 200 feet apart. Be sure to leave some gaps in the windrows for wildlife movement. Once piled, prescribed burning can be used to burn the piles or windrows prior to planting, but care should be taken to conduct the burn on days that will minimize smoke.

**Bedding:** Bedding is a site preparation method to plow up the soil much like in agriculture except the top of the row is packed down with some type of roller. Originally, bedding was used and still is being used to improve seedling survival on wetter soils by getting their roots above the water. Bedding has been found to mound the topsoil and organic matter into a long continuous strip that improves seedling growth and survival. Thus, this site prep method has been used on sites that are not impacted by a high water table. The one area where bedding should not occur is on sites prone to droughts as the roots are further away from the water table and the beds may dry out during a prolonged drought. A dozer is the equipment usually used to pull the bedding plow. The beds should be arranged on the site to allow for drainage. This site prep method is often combined with shearing as the area needs to be relatively free of debris. A real plus is that the tree planters have a definite row to follow when planting the seedlings.

**Three-In-One Combination Plow:** The 3-in-1-combination plow is primarily used on cutover or clearcut tracts that contain large amounts of logging slash or small undesirable stems. The shearing blade cuts and pushed the debris out of the path of the bedding plow. The four rotating disks located directly behind the subsoiler (ripping blade) cultivate a planting bed 12 inches above the normal ground level promoting root development. This method of site preparation is performed from late spring through the fall and the bed should be allowed to settle at least three months before seedlings are planted in the bed. This site prep treatment should be performed on the contour of the site to prevent erosion. This method will usually require a release treatment of herbicide in the first or second year after tree planting to reduce herbaceous vegetation from competing with the seedlings.

**Subsoiling/Ripping:** Subsoiling/ripping is a mechanical site prep method for heavy soils on cutover or agricultural lands that have a compacted layer at or below the soil surface that limits root growth and development. Ripping has also been used in hilly terrain with shallow soils to improve the rooting area of the seedlings. Subsoiling/ripping increases aeration and water-holding capacity of compacted soils and breaks up root restricting hardpans and/or traffic pans. It is highly recommended prior to planting trees on hayfields, pasture or cropland. A farm tractor or dozer on cutover sites, pulling a subsoil shank performs subsoiling. The subsoiling shank must be a minimum length of 18 inches in order to rip the soil to a depth of 15 inches. The recommended time frame for subsoiling is summer through fall when the soil is generally dry and crumbly. The area subsoiled should receive several rains prior to tree planting to pack the soil down and reduce the open spaces. The rows should be placed at the desired planting width and along the contour.

**Drum Chopping:** Drum chopping is accomplished by the use of a heavy track vehicle (dozer) pulling one or two large metal cylinders (drums) with longitudinal cutting blades that chop or flatten vegetation to facilitate hand planting. The cylinders can be filled with water for added weight to improve their efficiency. This technique is applicable on most any site with light to heavy vegetative/debris cover that would prohibit or hamper hand planting. Limitations include sites with debris or residual timber six inches or larger in diameter, excessive slope, extreme wetness, and large rock or other debris incapable of being chopped. Drum chopping is effective in flattening the smaller diameter stems and logging debris. The chopped areas are good candidates for a prescribed burn to further reduce the debris and facilitate tree planting. Be careful on chopped sites as some stems may not be severed at the ground line leaving a sharp stem projecting up on the site.

**Mowing or bush-hogging:** Mowing may be used as a site prep method on old pastures, abandoned fields and young plantations that need to be started over. The stems to be cut are small in diameter but would definitely interfere with tree planting. Several heavy duty brush cutters can even handle stems up to 5 inches in diameter. The mowing can occur at any point up to the time when trees are going to be planted on the site. The mowed area is definitely a good candidate for prescribed burning and/or herbicide treatments. Something to be considered is that mowing should not be conducted during the nesting season for quail and/or turkeys.

**Disking:** The site preparation method of disking is often used on abandoned fields, pastures and agriculture lands to break up compacted soils. Disking breaks the compacted soil layer, incorporates organic matter into the soil promoting better seedling growth and survival. This site prep method is usually conducted on sites with light amounts of debris and small residual stems generally less than 2 inches in diameter.

**Scalping:** The site preparation method of scalping is used to remove the top layer of sod that may hinder proper tree planting and seedling survival due to competition and white grub type beetle attacks. Scalping is performed in conjunction with subsoiling on pastures or abandoned fields with a heavy grass component. Scalping removes the sod created by grasses such as fescue and bermudagrass and is highly recommended when converting pastures or abandoned fields to longleaf pine. This site preparation method has not been used as often with other southern pine species establishment.

**Mulching:** Mulching is a site preparation method that shreds or tears up vegetation by means of a series of teeth on a big roller. The mulcher can be attached to a dozer, skidder, bobcat or on a mulching machine. This site prep method is good on light to medium brush although some mulchers can shred larger trees. Mulching is also good to clean the understory vegetation to enhance natural regeneration.



Three-In-One plow



Rolling drum chopper.



Bush hog (brown tree cutter)



Bedding plow





Raking blade (note teeth separation)



Raking debris into windrows



K-G Blade for shearing



Shearing operation.



Subsoil



Disking

## Chemical Site Preparation

Chemical site preparation involves the use of herbicides to remove undesirable vegetation from an area targeted for regeneration. Herbicides are selected based on the undesirable vegetation to be removed along with the desirable vegetation that will be re-established on the site. Chemical site preparation is a very effective method of preparing an area for regeneration either by artificial (planting or direct seeding) or natural (seeding). For chemical applications, use appropriate and approved herbicides for forestry and follow the herbicide label for timing and amount to use. *Important: Follow the label recommendations!* Get herbicide recommendations from licensed professionals.

Herbicides are pesticides designed to target unwanted trees, weeds or grasses. Selective herbicides only remove targeted plants while not harming desirable plants. It is critical to choose the correct herbicide(s) for site preparation depending upon the site specific conditions.

Chemical site preparation can be applied by a variety of methods. The method of applying herbicides will vary depending upon costs, amount of acreage being treated, topography, and residual vegetation to be removed. Below are a few methods of applying herbicides in forestry applications.

**Aerial:** Aerial applications of forestry herbicides are a proven and efficient method of applying herbicides in chemical site preparation. The primary method has been with the use of helicopters because of the maneuverability and ability to land in smaller open areas close to the area to be treated. The spray booms used on helicopters are configured to release large droplets of water and product to descend quickly for accurate placement. Additionally, additives can improve droplet size, reduce drift and improve the plants ability to absorb the herbicide.

Tract boundaries and critical areas like streams or ponds must be clearly delineated prior to application to avoid potential problems. Some aerial applicators use an onboard geographic positioning system and a flow meter which record the exact placement of the application along with the amount of material applied. Whatever method is chosen to identify the tract, be sure the applicator understands the desired goals and exactly what areas are to be treated.

Aerial applications of herbicides are widely used for site preparation and other forestry practices. Aerial applications are very effective on large acreages or where several smaller acreages are within close proximity of each other. Avoid spraying during periods when the surface wind exceeds 5 mph or immediately before or after a rain which could wash the chemical off of the targeted vegetation and potentially off site. Nozzles that deliver herbicides in large droplet sizes should be used in combination with drift control agents.

Also, the presence of a helicopter or fixed wing aircraft near any sensitive area is likely to draw considerable attention to a spray operation regardless of risks. Advance notification of the operation to the local population can be used to determine any objections. In such cases alternative application methods or mechanical treatments may be advisable. Foliar ground applications are generally less prone to drift than aerial. It may be advisable to treat buffer areas surrounding a tract by hand or other ground methods and broadcast treat only the interior portion of the site.

**Ground:** Application of herbicide by ground based heavy equipment such as skidders, dozers or tractors to prepare an area for regeneration using artificial or natural methods. Ground herbicide applications are useful where it is too hazardous to attract an aerial herbicide applicator like small tracts or where drift must be kept to a minimum. Also, ground applications allow portions of the area to remain untreated for wildlife or aesthetic benefits.

Ground applications involve a tank mix of herbicide and water preferably mounted on the equipment. Large booms are not very effective in forestry applications where small trees or shrubs are still in place. Cluster nozzles or clusters of nozzles are developed to spray from 20 to 30 feet on both sides of the equipment. Many of these nozzles can be adjusted to close off one side of the spray to target only one directional spraying. These cluster nozzles are effective even through thick vegetation.

The biggest problem with ground applications is leaving skips or untreated areas throughout the tract or overlapping spray that uses too much of the herbicide mixture. Some spray operations unwind some string to mark the trail that the equipment traveled while spraying. Factors influencing the choice of application include the herbicide rate, the type of herbicide, the tract size, topography, stand density, presence of sensitive areas and wildlife habitat.

**Tract Size:** The tract size does influence the application method and the cost associated with that application. Contractors using aircraft or large equipment have a general desire to work large tracts of land because of the fixed costs associated with moving and setting up equipment. Their cost per acre decreases as the number of acres treated increases. Many contractors are often reluctant to treat small tracts unless there is a grouping of smaller tracts in a localized area due to their costs. Commercial applicators that use ground crews with backpack sprayers or other hand-held devices are available in many areas and they are less affected by tract size and will often work smaller tracts at a reasonable cost.

**Topography:** Rough terrain or inaccessibility can preclude the use of ground crews or equipment. Aerial applications are often the only practical means of treating such lands. Tracts with water bodies, rivers or streams may be limited to ground applications to prevent drift from mixing with the water.

**Stand Density and Structure:** Ground applications of herbicides require a site that machinery or ground crews can move across with reasonable ease. When applying foliar or soil-active products at a rate per unit area, machinery such as rubber tired skidders, tractors or track vehicles must be capable of moving at a uniform speed. Such applications are practical only on sites with few trees left after harvest. Varying the equipment speed will cause the herbicide rate to vary across the tract.

Aerial applications are affected by stand structure. Lower components of multistory canopies can be difficult to cover with foliar treatments due to shielding from taller trees. Partial solutions to this problem include increasing total gallons of spray per acre, using solid formulations or products with both foliar and soil activity.

**Sensitive Areas:** The location of sensitive areas such as crops, endangered species, water sources, wetlands, grazing lands, dwellings and public areas can have a direct effect on application method as well as herbicide selection. Movement of herbicide from the target area to any of these sensitive areas may be a label violation subject to litigation. This can occur through drift of fine spray particles during application, movement of volatilized product during or after application, and movement of products in surface water. Potential problems can be avoided by using proper equipment and selecting products that do not volatilize or move with surface water and controlling drift with appropriate additives, nozzle selection and pressure settings. Soil-active products in liquid or granular form can be applied from the ground with little risk of drift. Products that will move with surface water should not be used on sites that drain into water supplies or any other sensitive area.

**Wildlife Habitat:** Land managers should be aware of possible impacts of herbicides on wildlife. Normally, impacts on wildlife due to direct exposure to forestry herbicides are negligible. Forestry



herbicides are not highly toxic to animals, they are applied at relatively low rates, and they do not persist for long periods in the environment. Herbicides impact wildlife primarily by affecting habitat. This impact may be positive or negative. The degree of habitat modification depends upon the component of vegetation at which the treatment is directed and the type of application.

Some herbicides primarily control woody species, some control herbaceous grasses and forbs, while others can temporarily eliminate nearly all vegetation on a site when broadcast at highest labeled rates. Even in the most extreme case the effects are temporary. Sites treated with broadcast applications generally re-vegetate within a year after treatment. Herbicide applications can be manipulated to favor wildlife, to create habitat diversity and enhance wildlife food and cover.

*Additional Factors Affecting Application Method:* Use only the application methods listed on the product labels for the targeted forestry treatment (site preparation, herbaceous weed control, injection, etc). Additional methods may be legal as long as the label does not prohibit their use. However, we advise a potential user to check with either a representative of the product manufacturer or with the Cooperative Extension Service before using methods not included on the label. The label is the law with regard to herbicide applications and use.



CO2 backpack sprayer with 2 nozzle boom (3-5 ft - coverage)



CO2 backpack sprayer with aerial boom (10-15 ft-coverage)



Magnetic Mist sprayer (spray will be effective from 2-40 ft)



CO2 backpack sprayer with 4 nozzles (5-10 ft coverage)



Skidder with multiple nozzles (25-40 ft coverage)



Aerial application (depends upon boom length & height above vegetation)



Site prep using One-Step (planted to longleaf pine)



Shows the difference between treated & untreated



Same area as photo above 1 year later.



Skidder with tank & cluster nozzle



One should select the appropriate site preparation method based on the type of vegetation on the site, the past land use, topography, and costs. The desired goal is to prepare the site for planting using the site preparation method to get the job accomplished at the lowest possible cost. The site preparation methods mentioned in this document cover a variety of methods commonly use to prepare an area for planting. If you have any questions regarding any of these practices contact your technical staff, Texas Forest Service or a technical service provider.

Be sure to protect waterbodies, streams, rivers, wetlands or other sensitive areas in or adjacent to the area targeted for site preparation.

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